



Navigation 2

Skipper/XO Training
2006



Course Overview...



- The Chart
 - Primary emphasis on chart preparation
- The Fix
 - Visual & Electronic
 - Accuracy and errors
- The DR
 - The most important thing on the chart
- Making landfall
 - The Navigation Brief
- Navigation Party
 - Organization, procedures & philosophy
- Navigation Practical



Principles & Practice of Basic Navigation



- Fix taking
- Fix evaluation
- “Minimum Cyclic Routine”
 - Plot, Label, DR.. Plot, Label, DR.. Plot, Label, DR...
- Situational Awareness & “Gut Feel”
- Watch Captain involvement
- Midshipman Navigator involvement
- Skipper involvement



The Fix...



The Fix is:

WHERE YOU WERE



The Fix...



The Fix is:

THREE DIMENSIONAL

“Sounding – Checks with chart”



The Fatho....



Write the “No Go Sounding” In Grease Pencil Here





Fix Interval



Whatever you do, establish and maintain
a consistent fix interval

Need to be able to step back and see the
trend, and respond if the trend changes



Fix Interval



-
- What interval is required?
 - Hourly?
 - Half hourly?
 - Fifteen minutes?
 - Ten Minutes?
 - Five Minutes?
 - It depends
 - However, it should be obvious when looking at the chart when it changes – and why
 - The Skipper determines Fix Interval!



Fix Interval



- Open ocean – outbound
 - 1 hour maximum
- Open ocean – inbound
 - Frequently enough so you can see you approach develop
- The Bay
 - Where are you???
- Remember – these are fully crewed yachts
 - Whose mission is to train on navigation



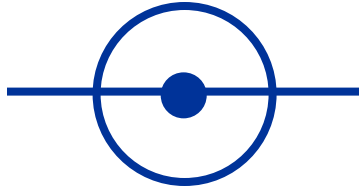
Fix Interval



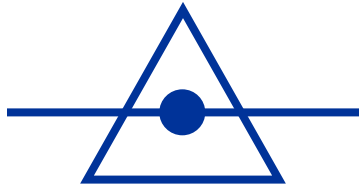
- SOP: “In piloting waters, the navigation plotter shall plot a fix at an interval that does not exceed half the time it would take the STC to reach the nearest navigation hazard at current speed.”



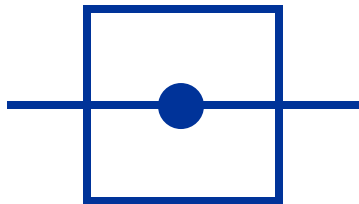
Symbols



Visual fix



Electronic fix (GPS, radar)



Estimate Position



Dead Reckon position



The Fix...

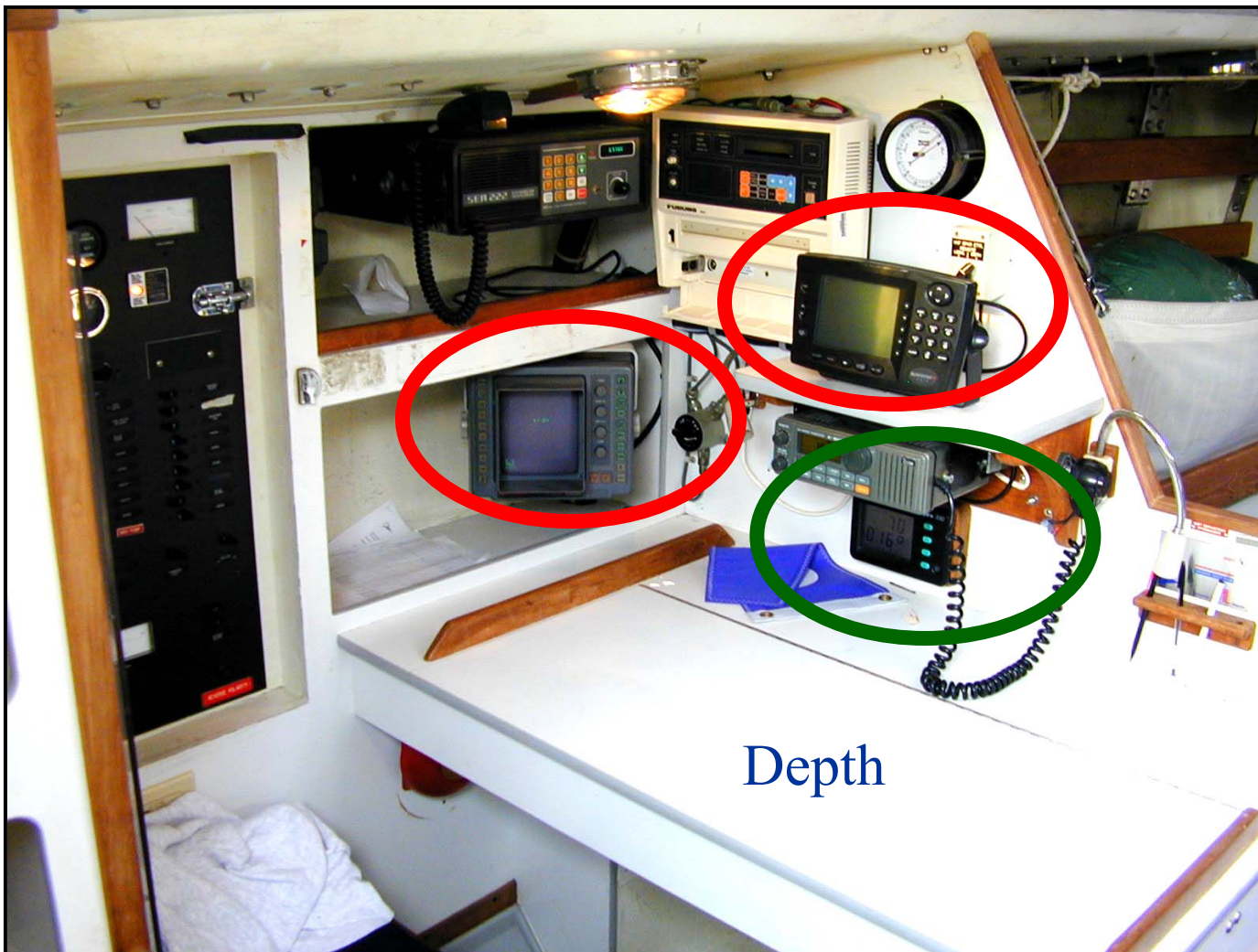


Treat Every Fix With

Suspicion



How Do You Take A Fix?



Depth



The Hand Bearing Compass...

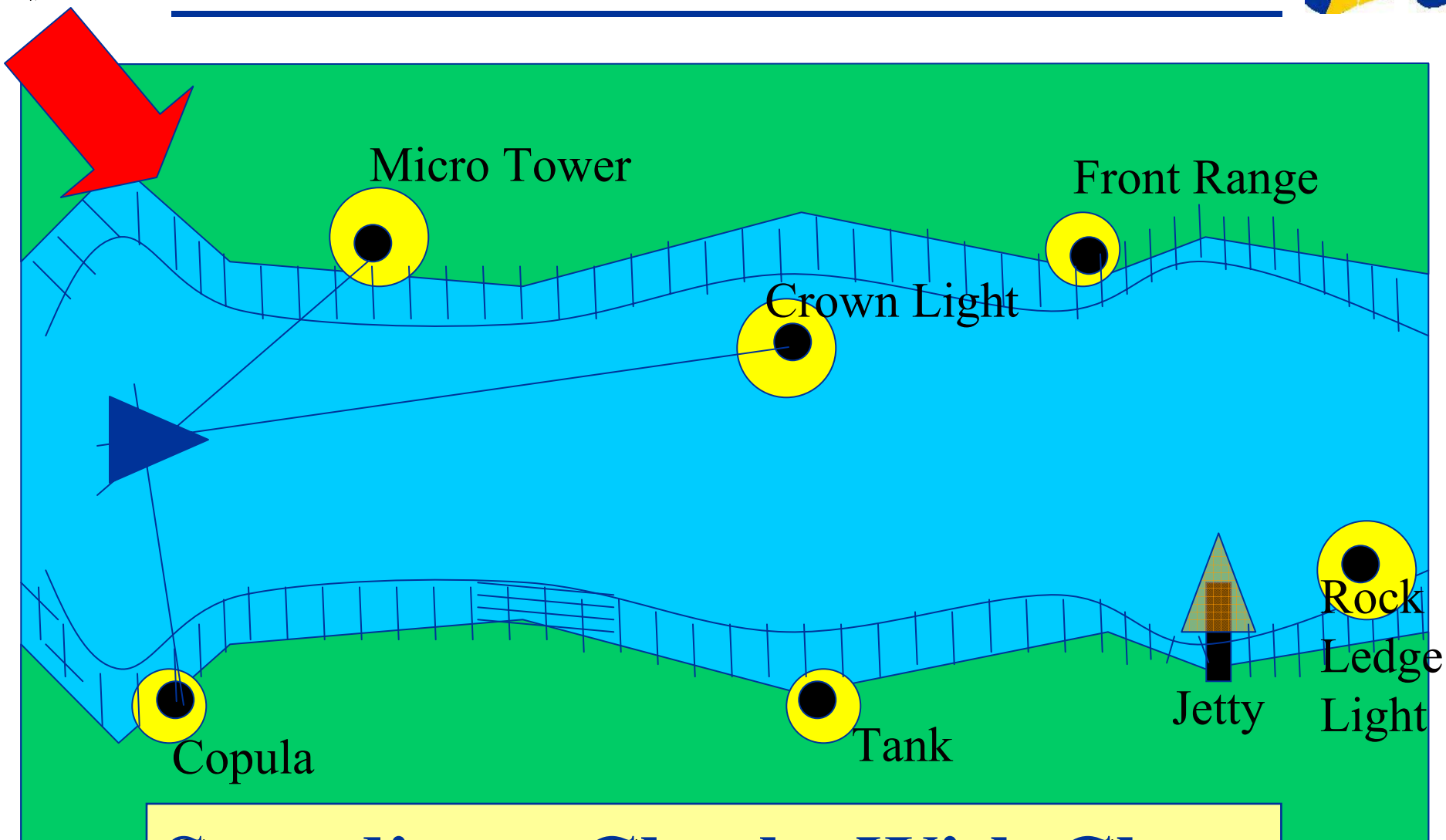


They come with a Lanyard – Use it!!!





Visual Fixes...



Sounding – Checks With Chart



“Taking A Round Of Bearings”



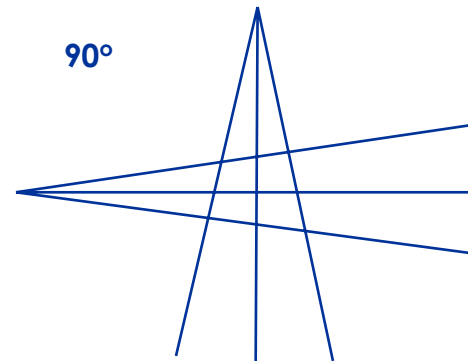
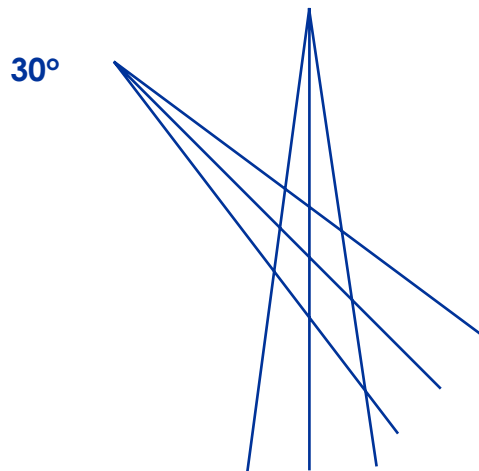
- The Mids are taught to shoot the most rapidly changing bearing first
 - Typically the beam bearing
 - May not be...
 - Why - Shooting at a given time
- In the sail training craft context, shoot the most rapidly changing bearing last
 - Mark the time
 - Why – Most up to date information



Optimum spread of LOPs



- In order to minimize the effect of possible errors in observed bearings, attempt to optimize the angular spread of objects shot
 - 2 objects should be as close to 90^0 apart as possible
 - 3 objects should optimally be 120^0 apart
 - The following illustration shows the reasoning behind this rule of thumb by showing the effects of a ± 5 error in the bearings of two objects 30^0 , and 90^0 apart :





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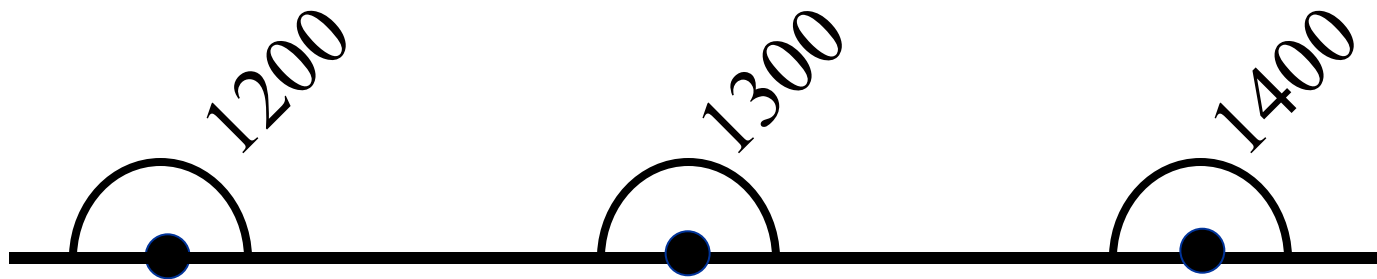
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The Six Rules Of Deduced Reckoning



1. Every hour on the hour

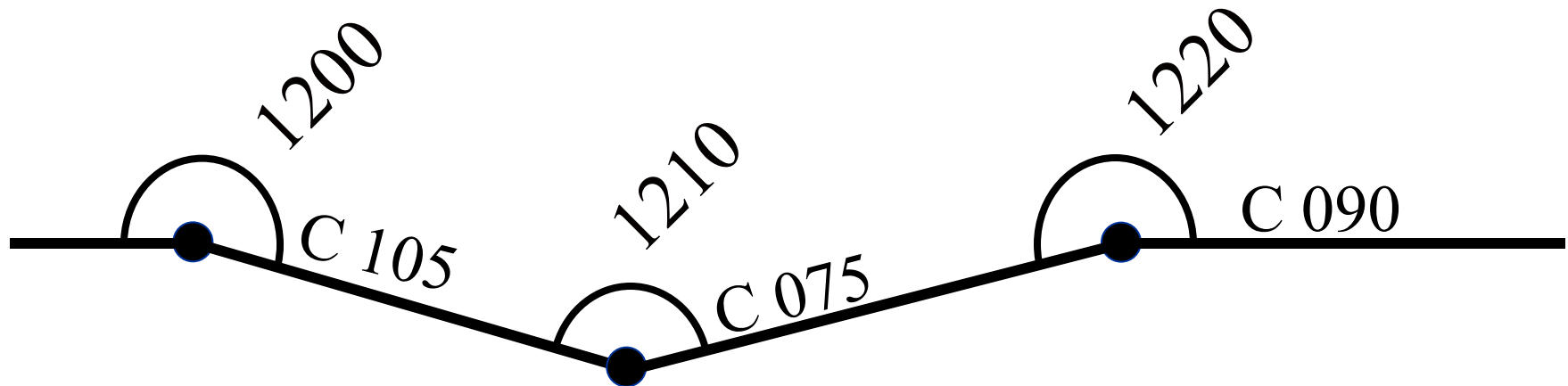




The Six Rules Of Deduced Reckoning



2. At the time of every course change

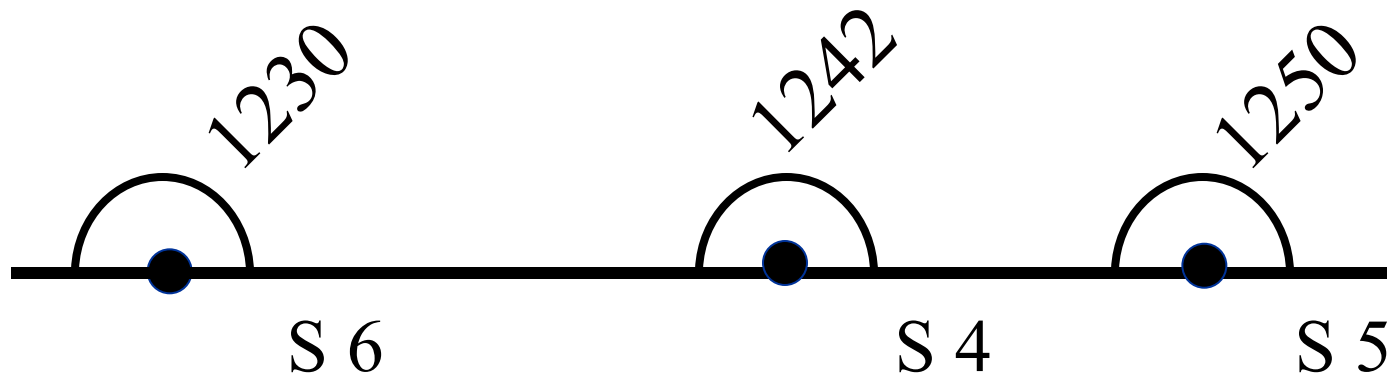




The Six Rules Of Deduced Reckoning



3. At the time of every speed change

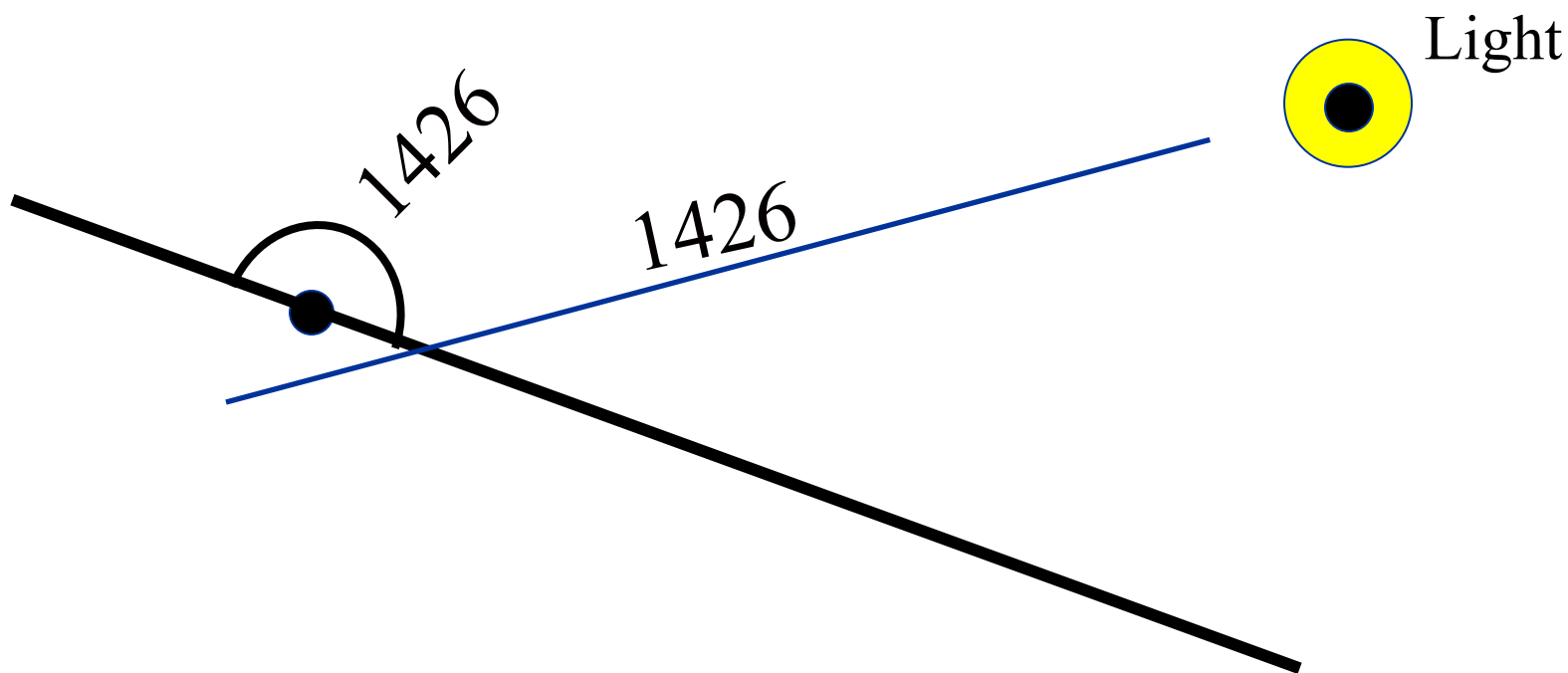




The Six Rules Of Deduced Reckoning



4. At the time of obtaining a single line of position

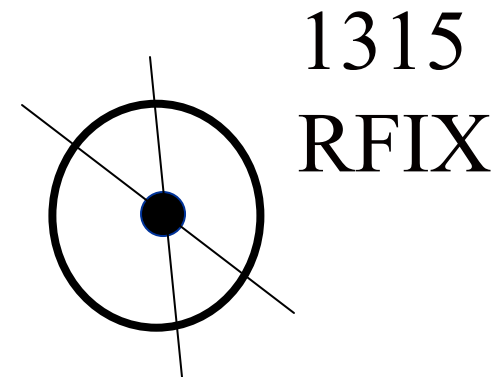
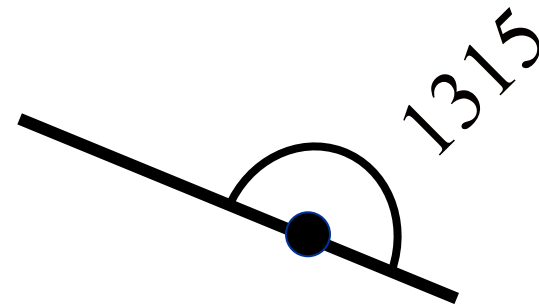
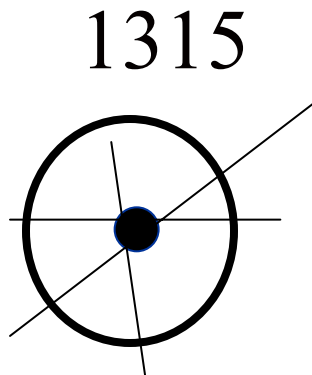
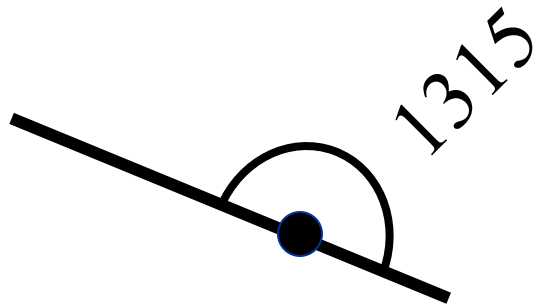




The Six Rules Of Deduced Reckoning



5. At the time of obtaining a fix or running fix

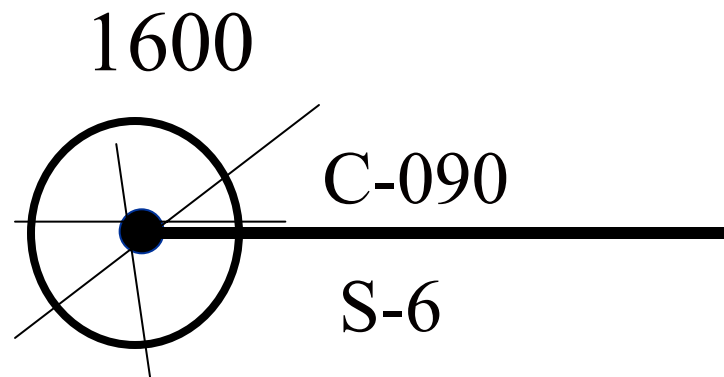




The Six Rules Of Deduced Reckoning



6. A new course line shall be drawn from each fix or running fix as soon as it is determined





The Six Rules Of Deduced Reckoning



1. Every hour on the hour
2. At the time of every course change
3. At the time of every speed change
4. At the time of obtaining a single line of position
5. At the time of obtaining a fix or running fix
6. A new course line shall be drawn from each fix or running fix as soon as it is determined

YOU MUST KNOW THESE!!!

You Must Know How To Apply These!!!



Couple of notes on DRs



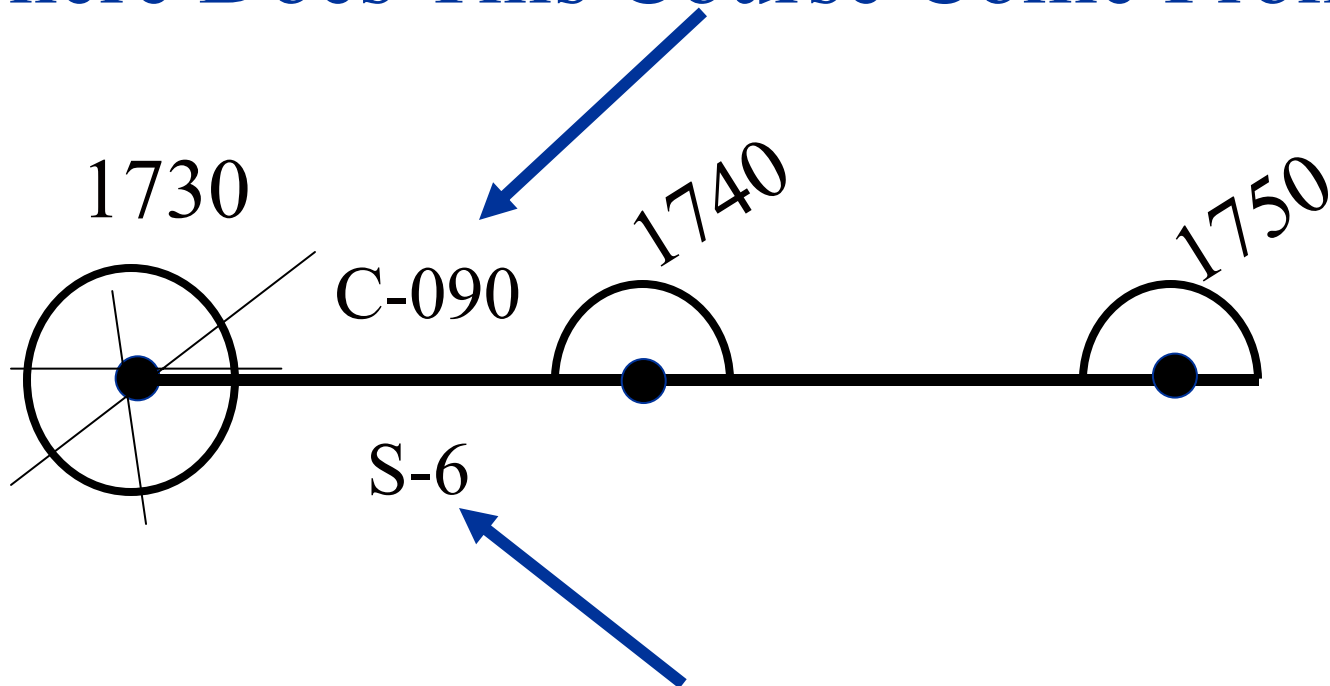
- NEVER draw a new course line from an EP or single LOP
- DO NOT include C & S at a DR position for a single LOP or a whole hour unless they changed at these times as well



Plot, Label, DR... Plot, Label,
DR... Plot, Label, DR...



Where Does This Course Come From???



Where Does This Speed Come From???

Sounding – Checks With Chart



The Fix & The DR...

The DR Is Based on Onboard Instrumentation



Do Not Use GPS

Course Over Ground/Speed Over Ground

“Weighted Averages...”



The Compass Rose...



Degrees True

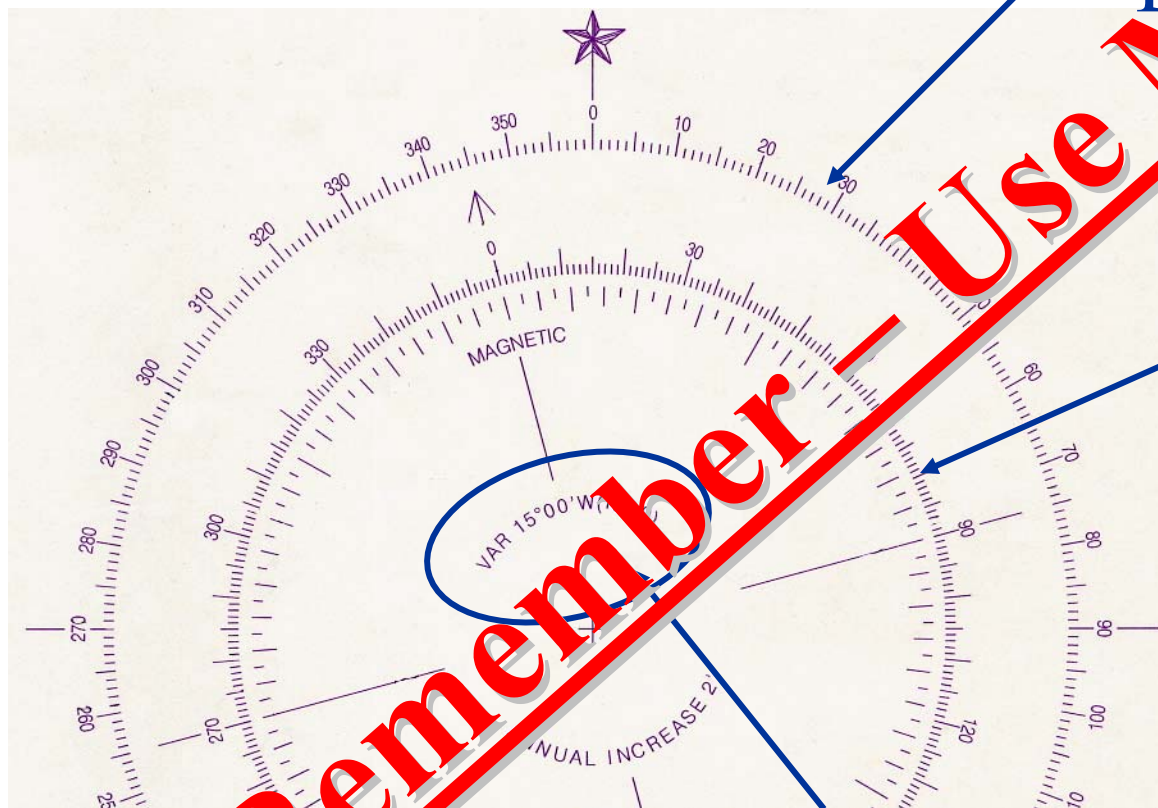
- Don't use this one...

Degrees Magnetic

- Use this one!!!

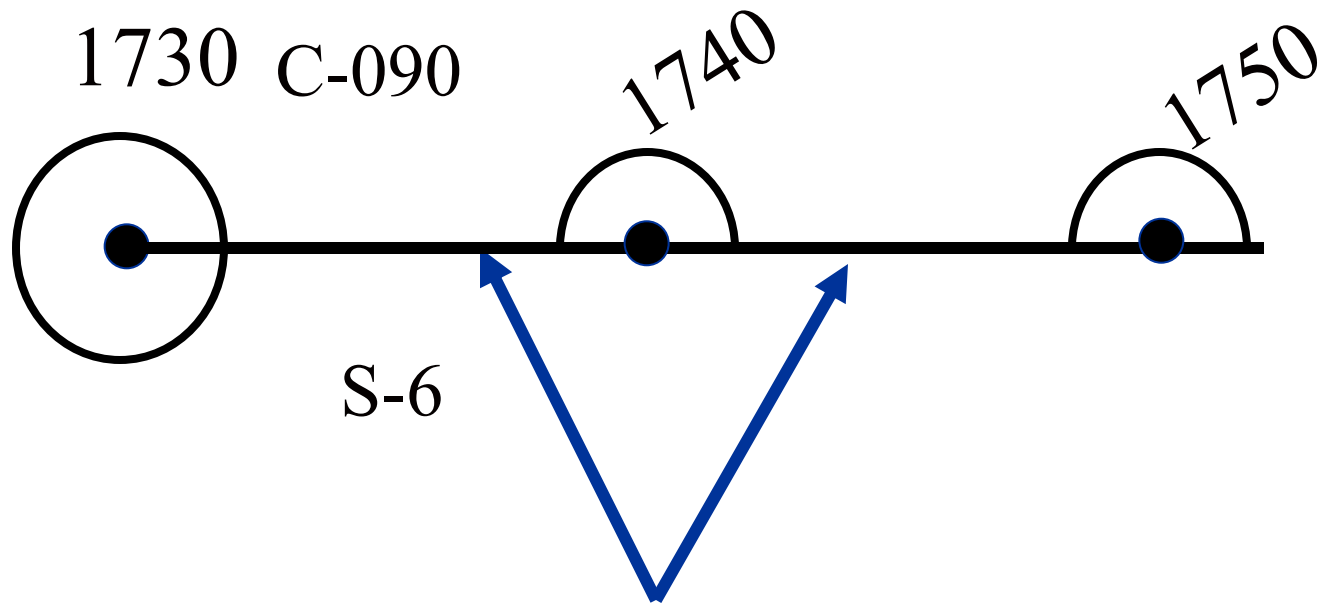
Variation...

- What do you need to know?





The Fix & The DR...



How Long Are These Segments???

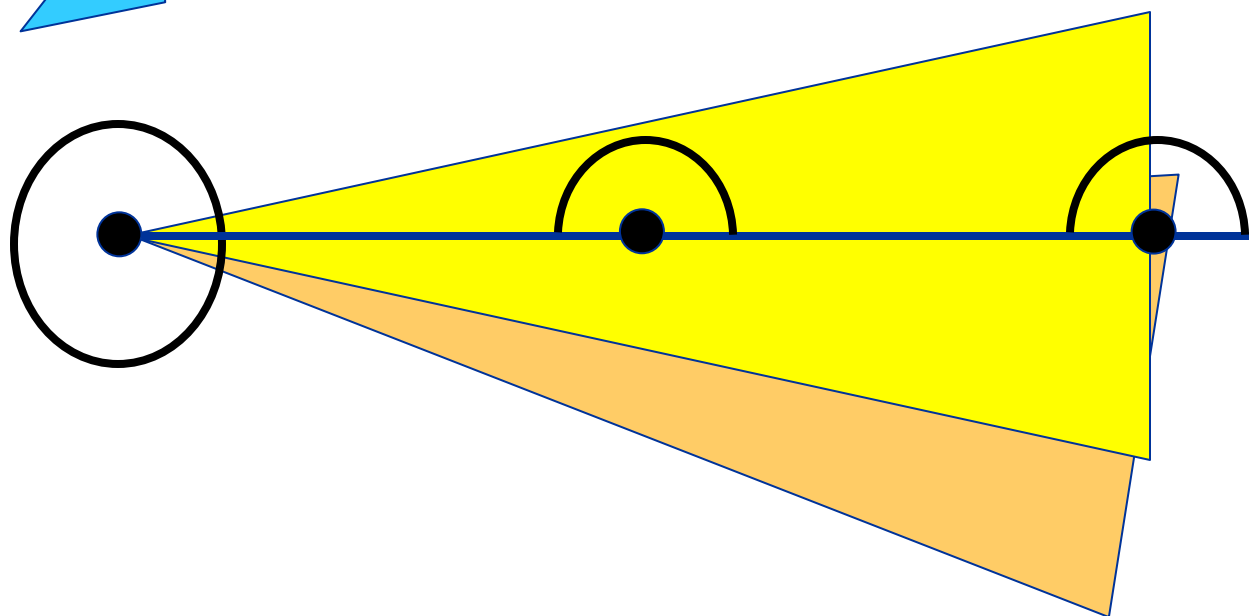
How Far Can You Go... Before You Plot A Fix Again?



The Nautical Slide Rule

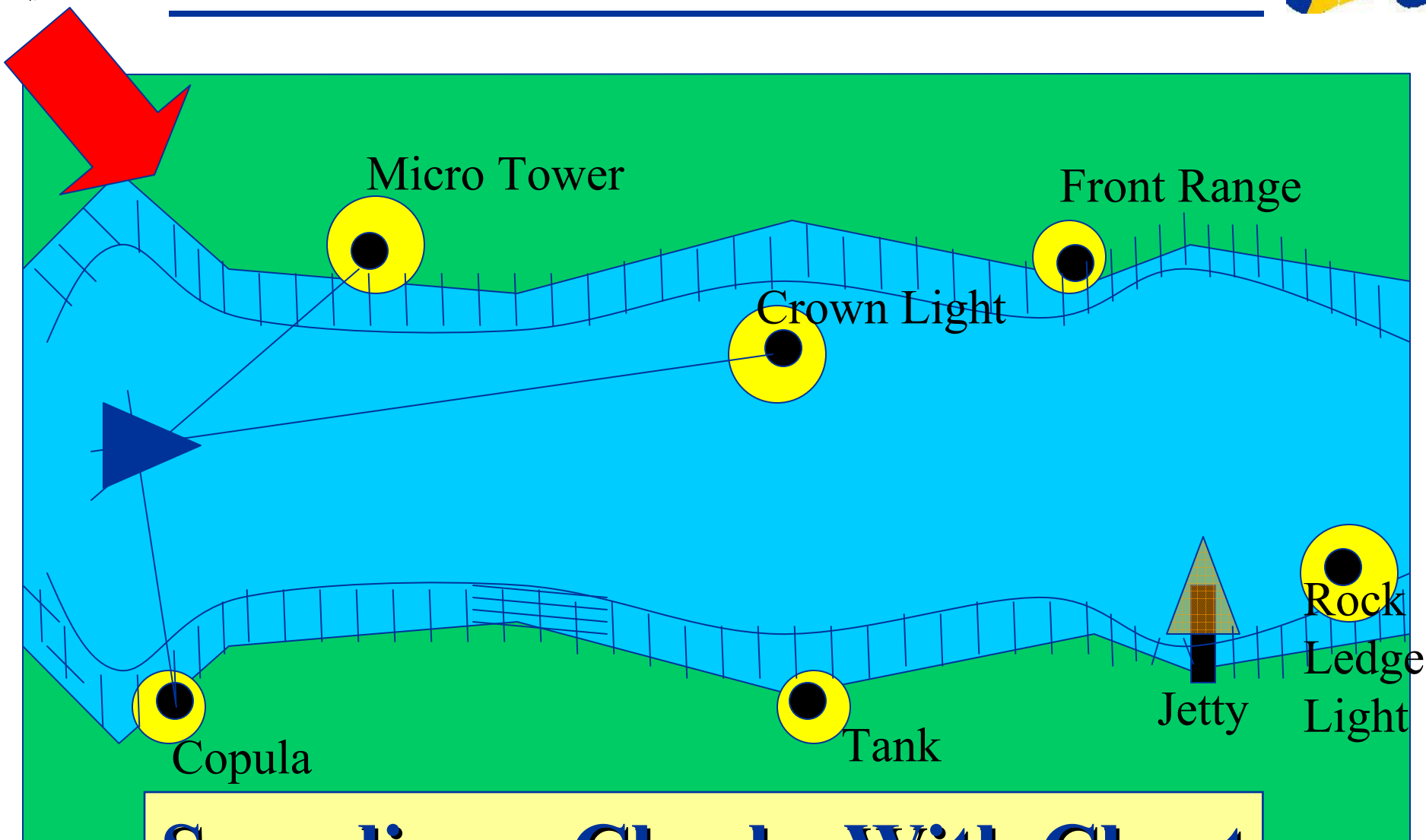
$$\underline{\text{Speed} \times \text{Time} = \text{Distance}}$$

The Fix & The DR... Uncertainty!!!





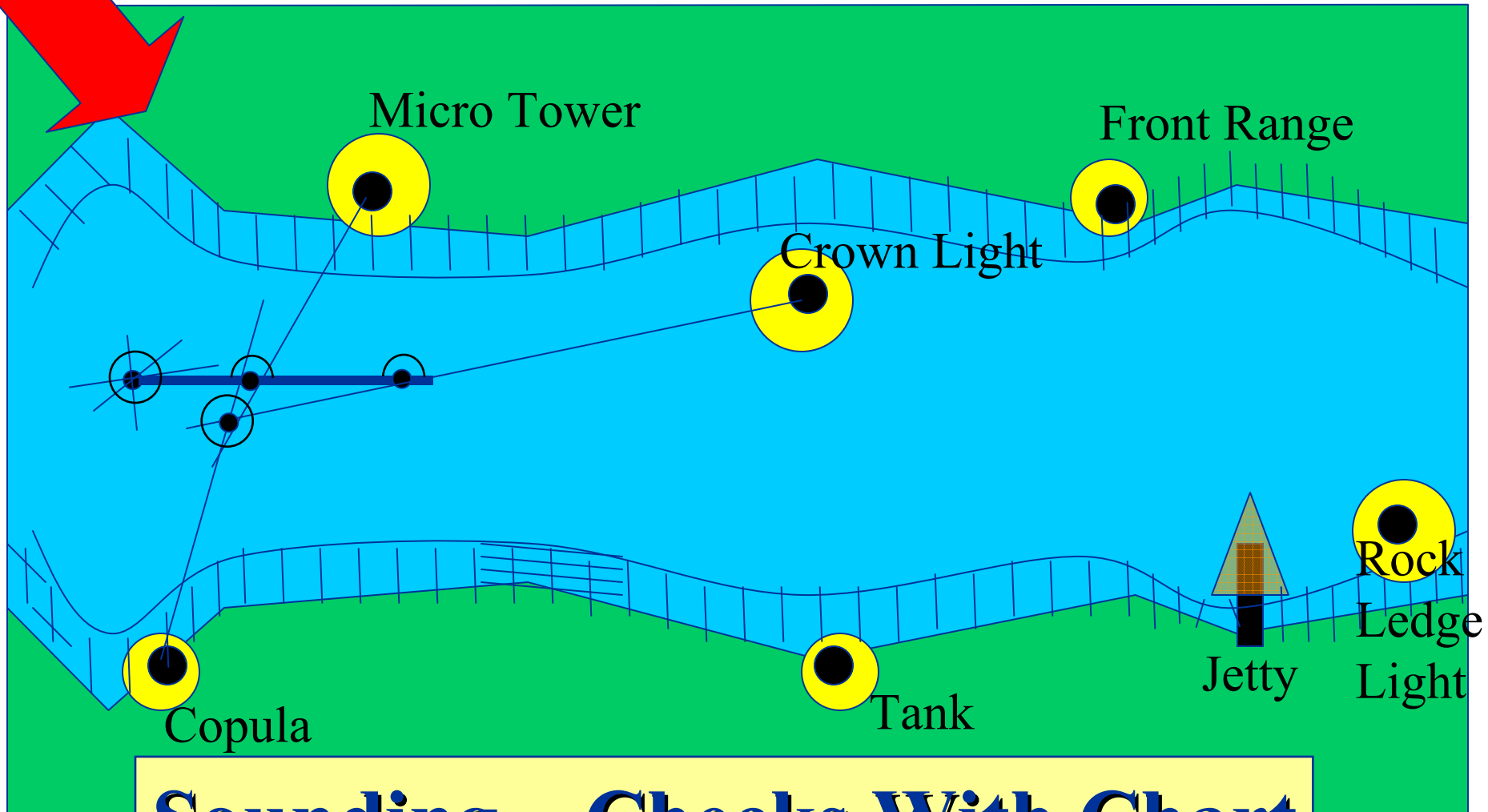
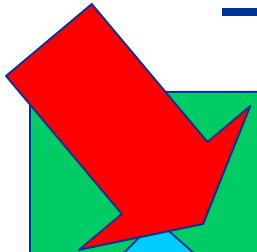
Visual Fixes...



Sounding – Checks With Chart

The Fix & The Dr...

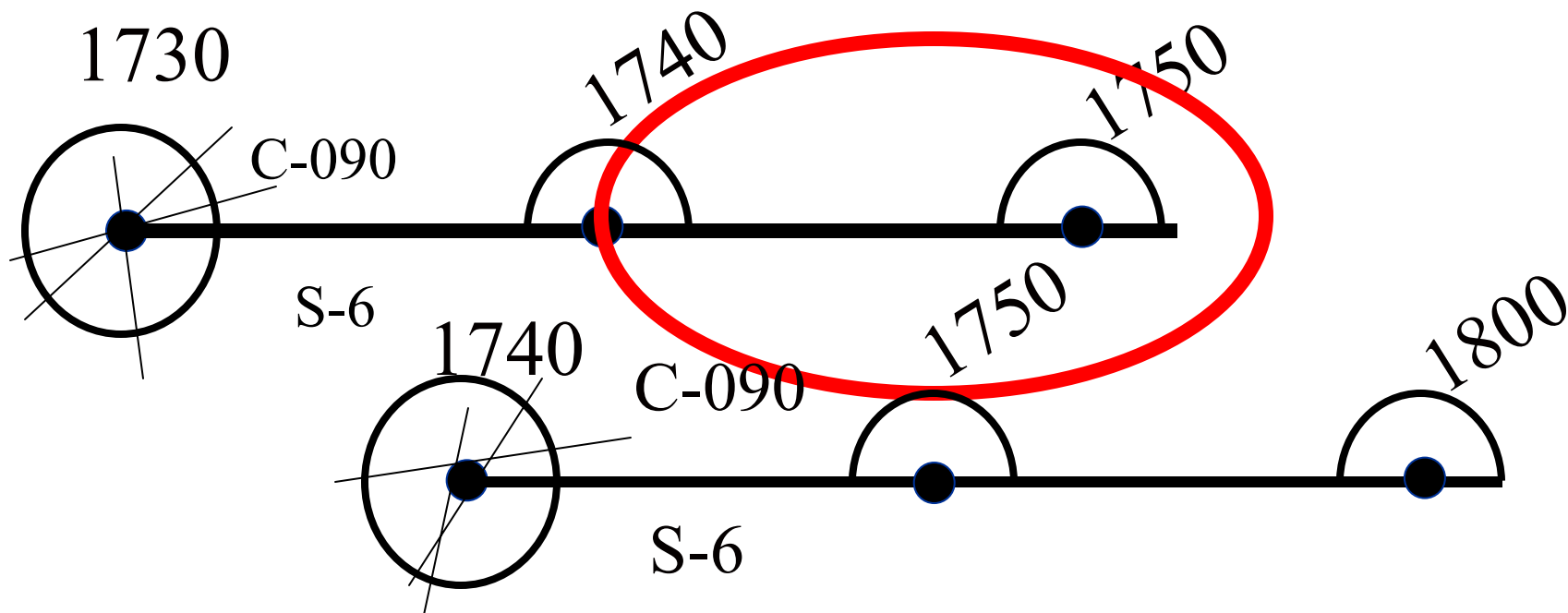
The Process



Sounding – Checks With Chart



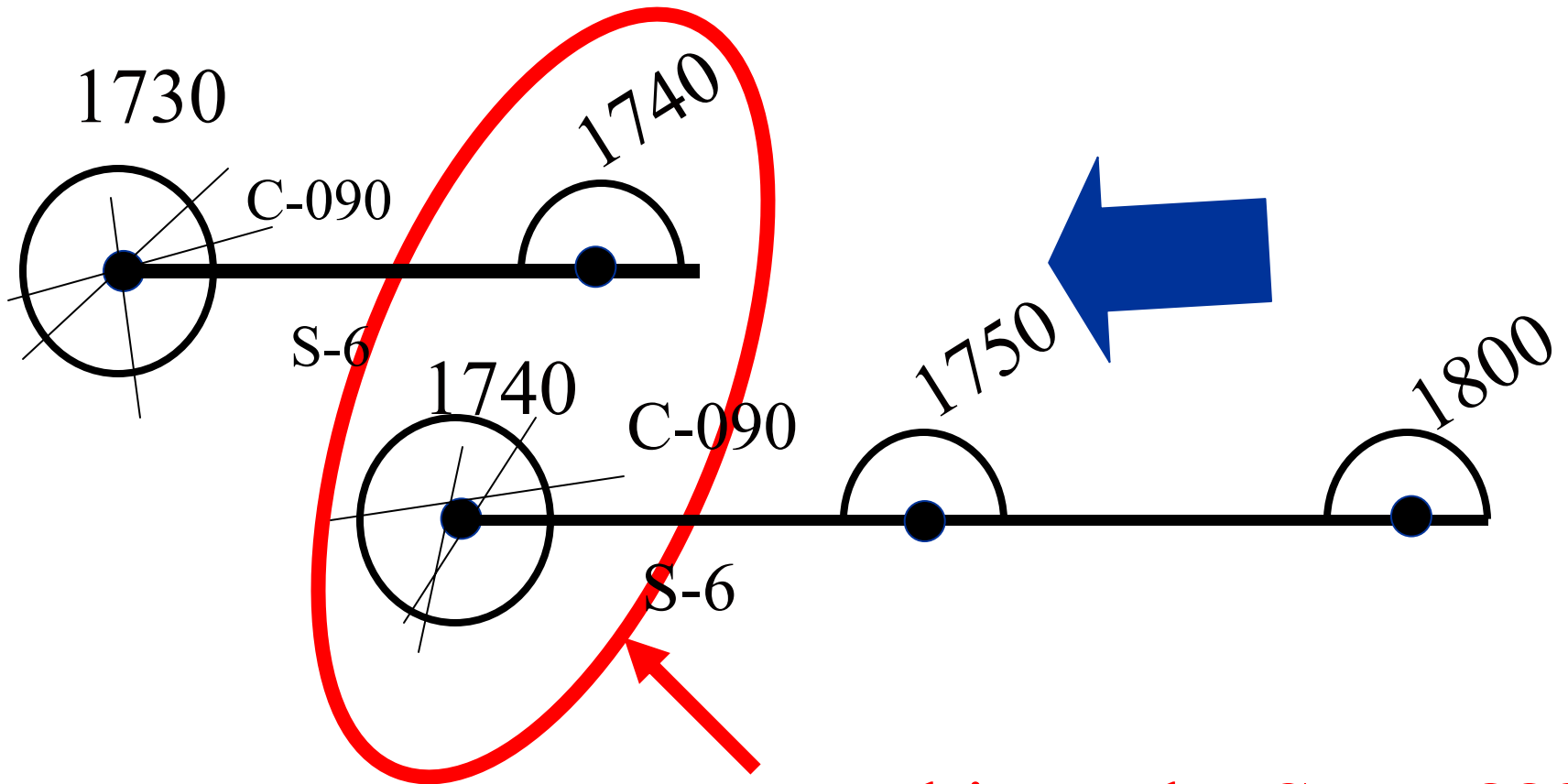
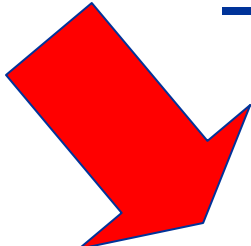
The Fix & The DR...



Sounding – Checks With Chart



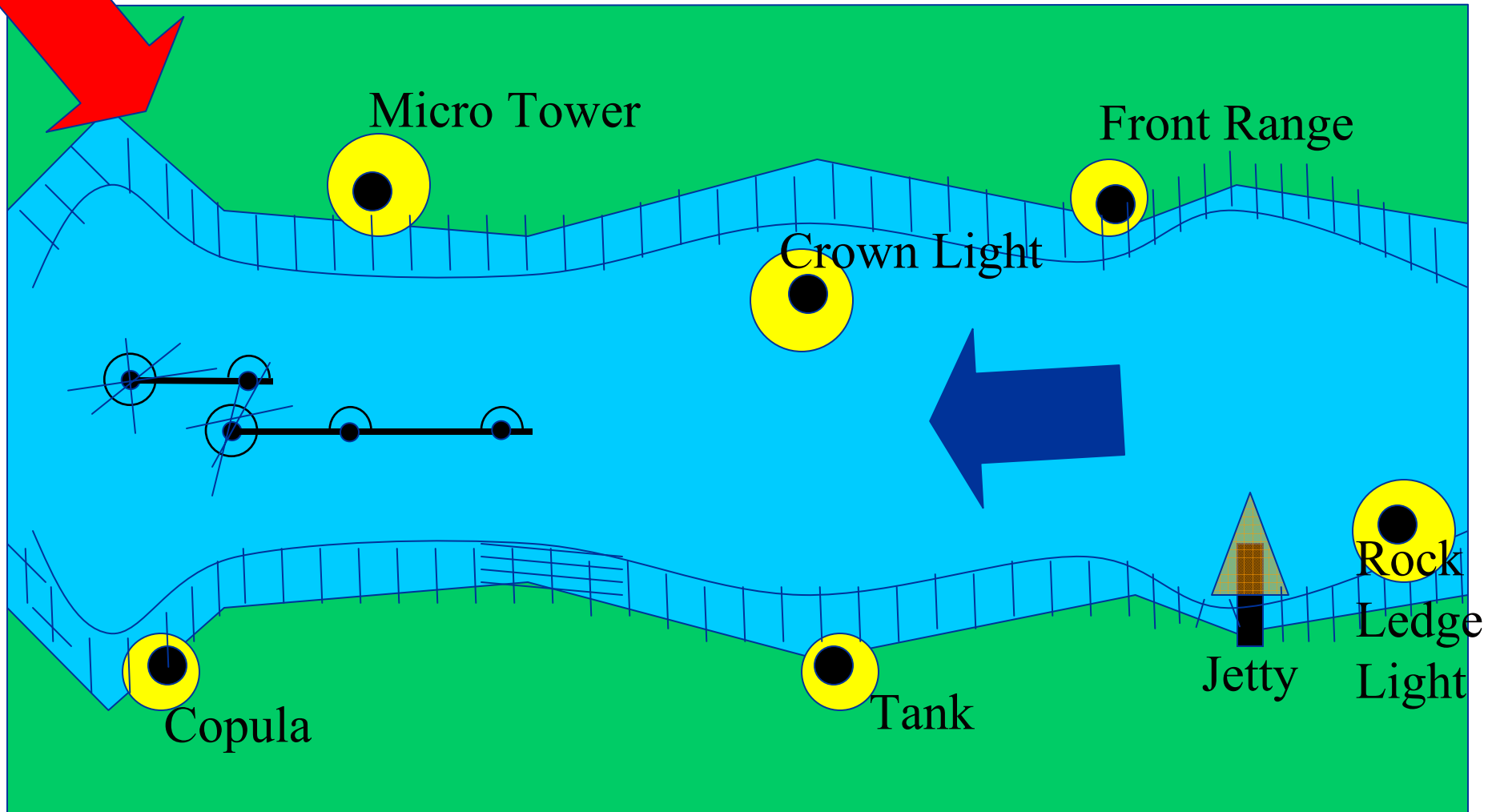
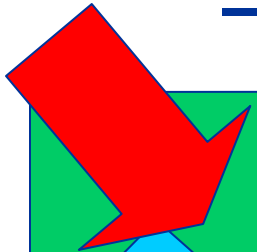
The Fix & The DR...



Does This Make Sense???

The Fix & The Dr...

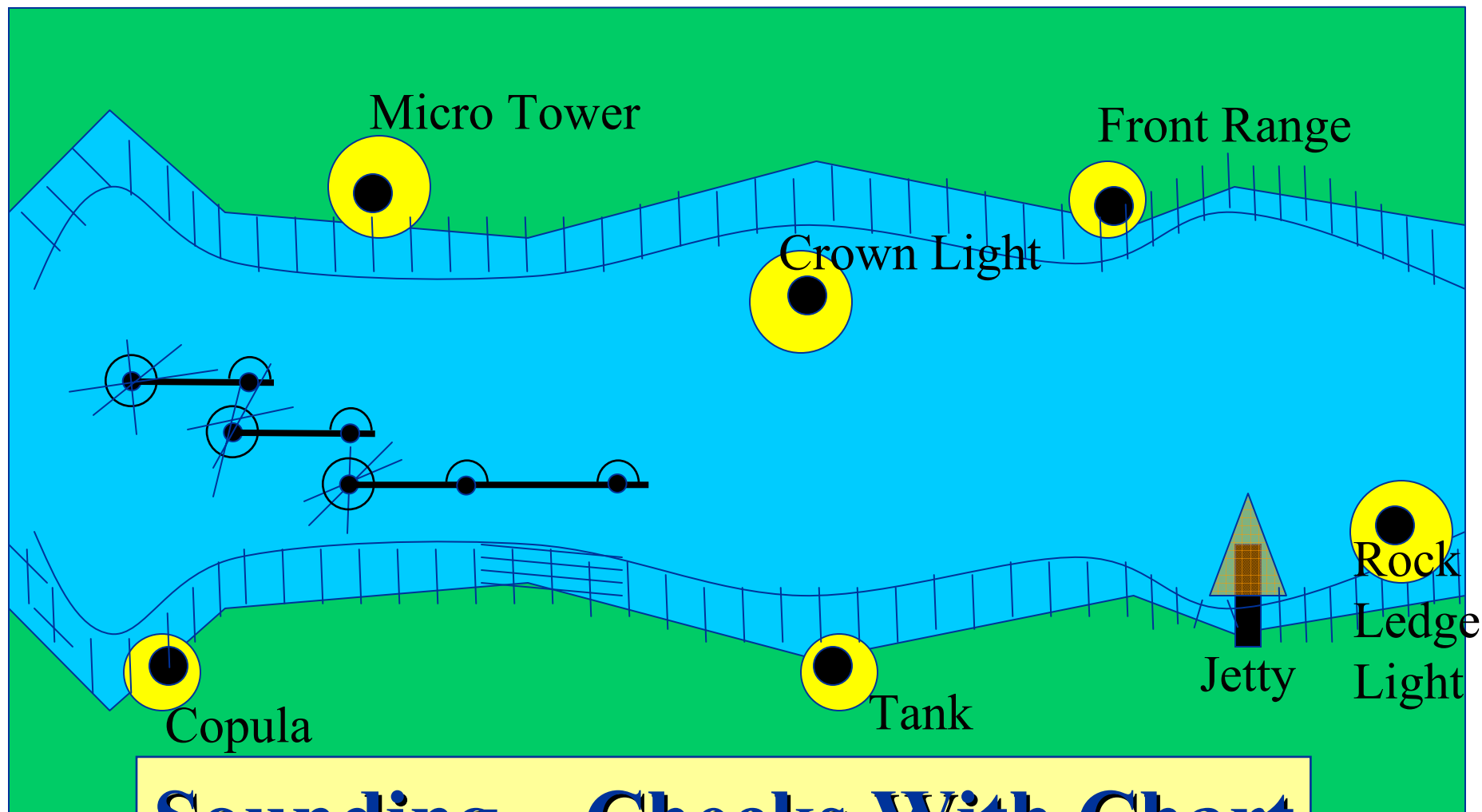
The Process





The Fix & The Dr...

The Process

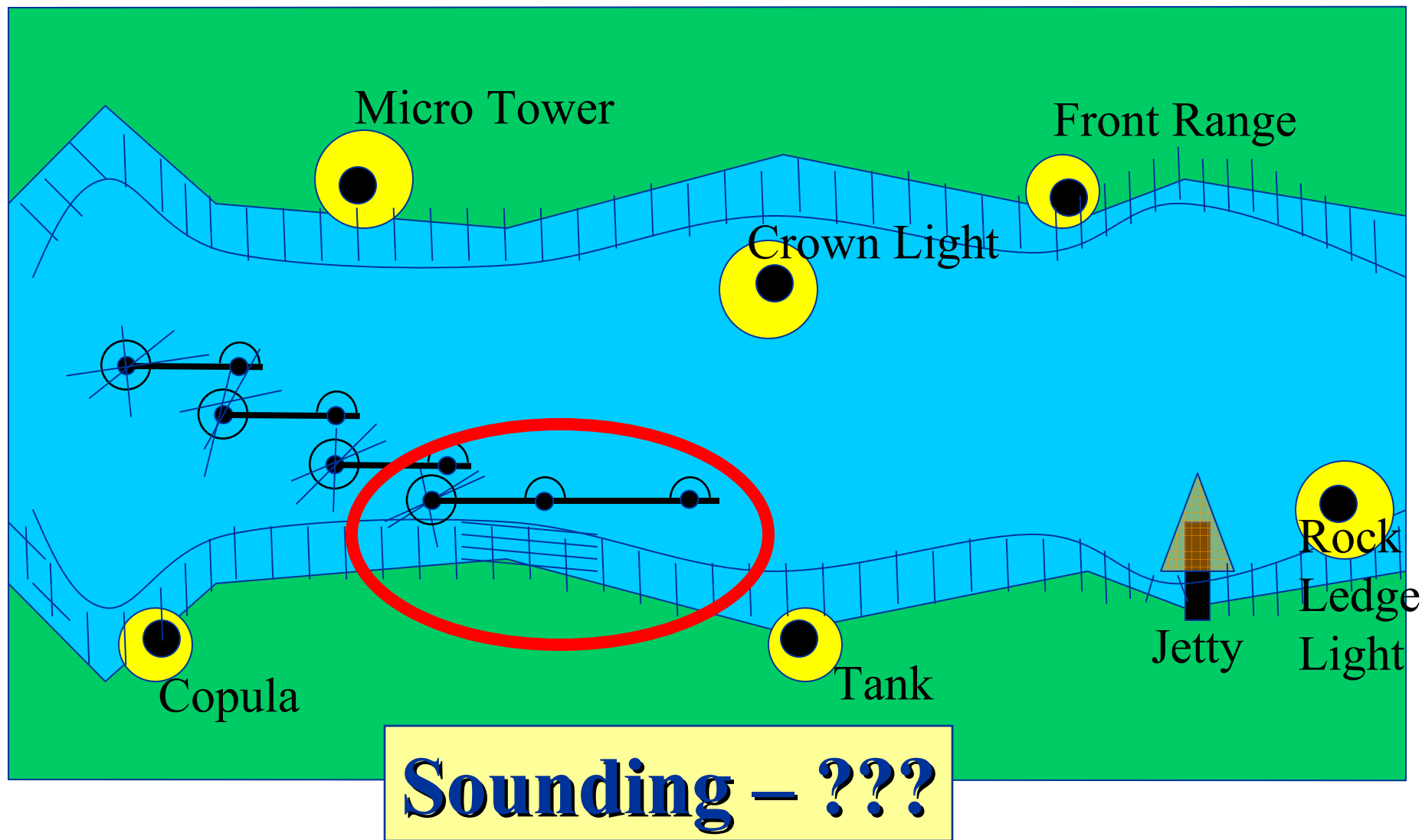


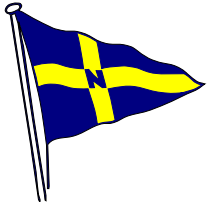
Sounding – Checks With Chart



The Fix & The Dr...

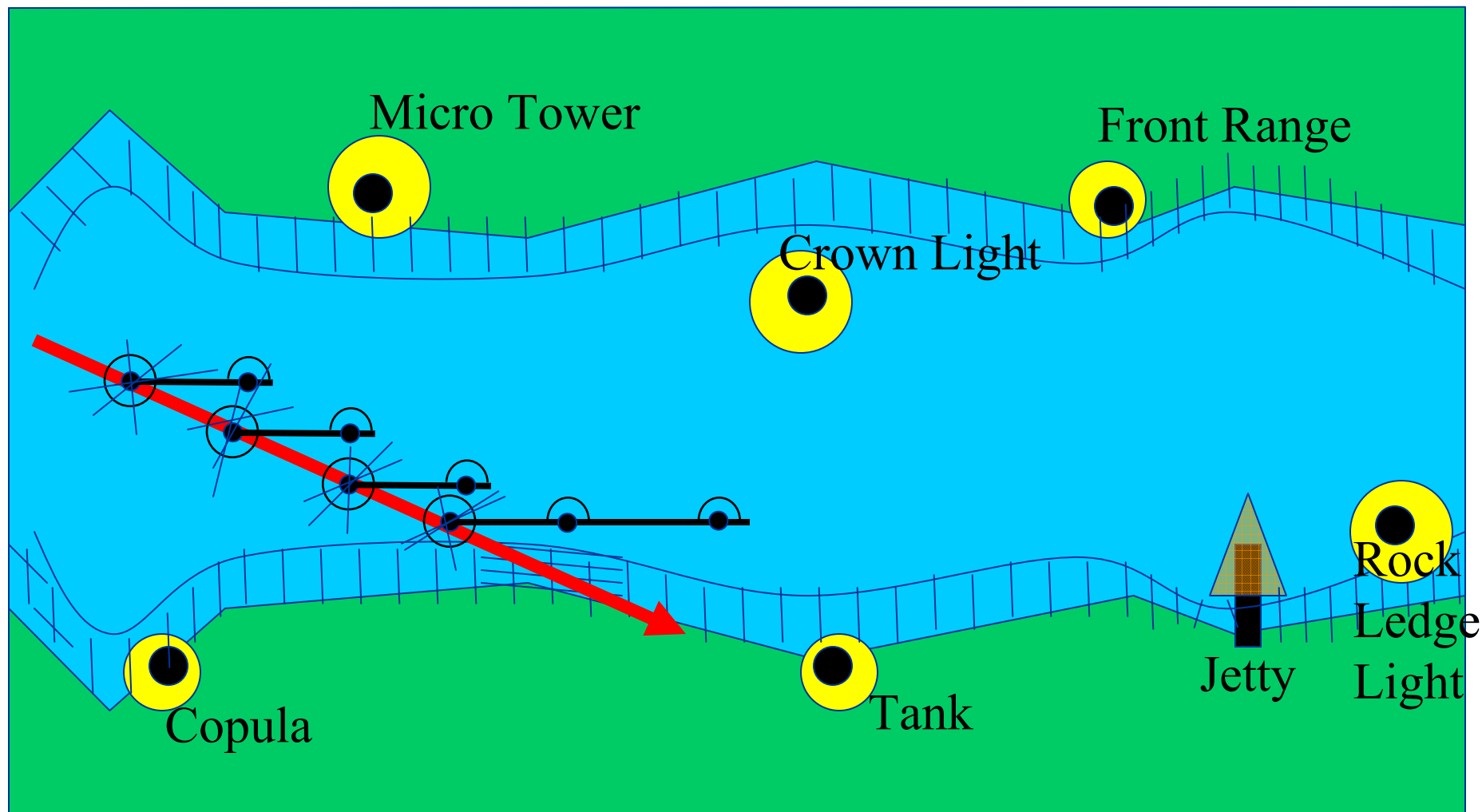
The Process





The Fix & The Dr...

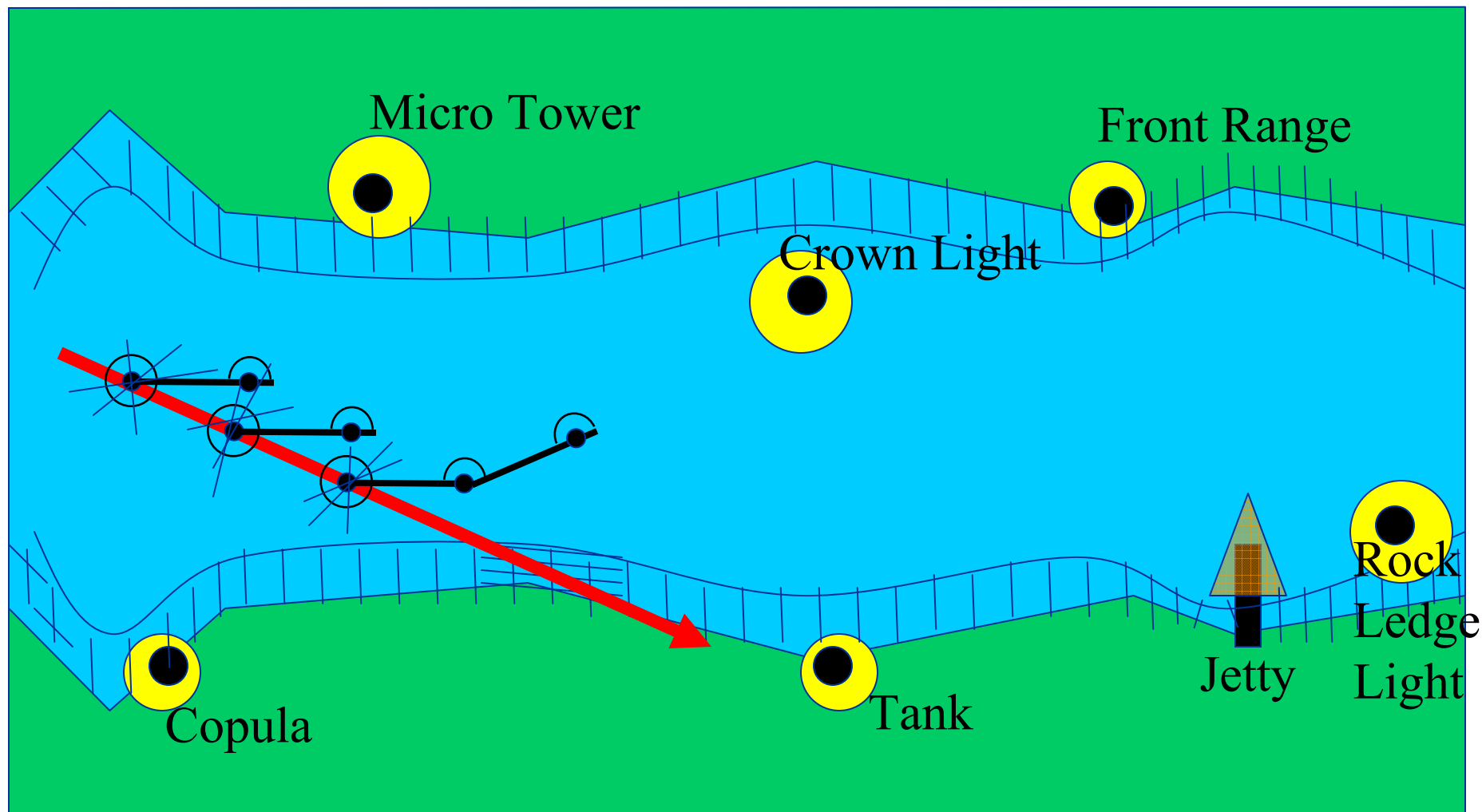
The Process





The Fix & The Dr...

The Process

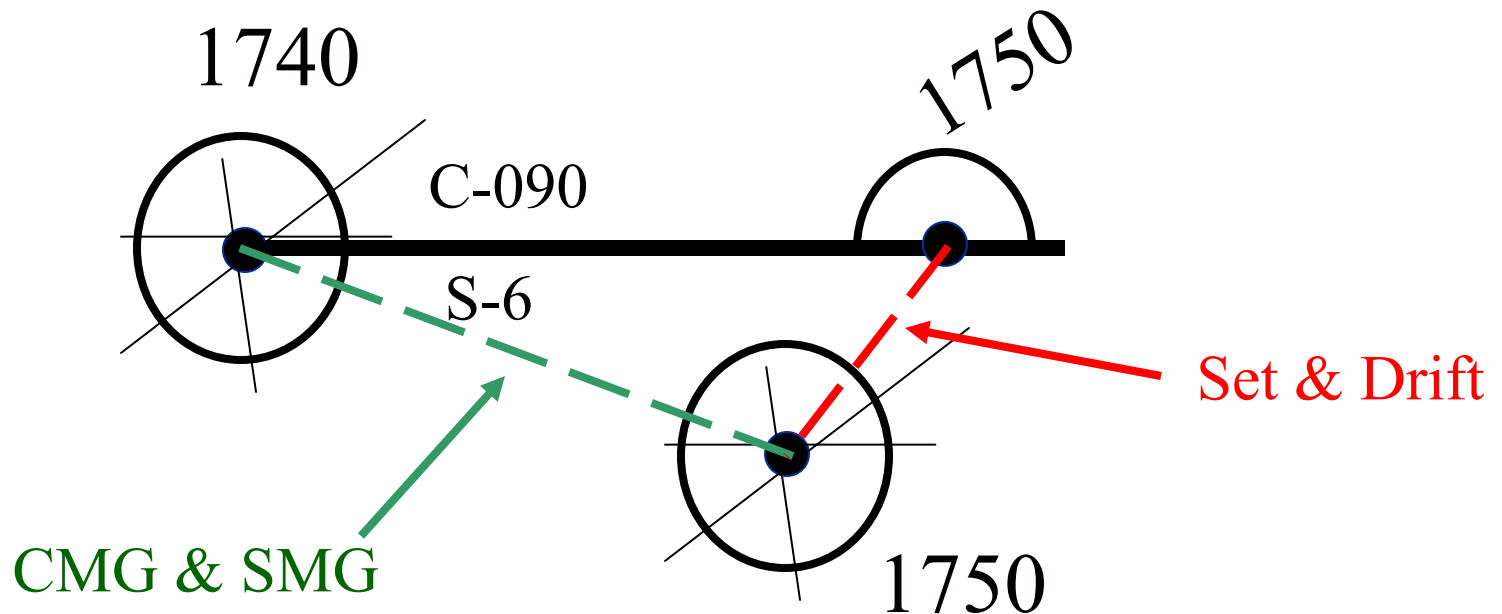




Current triangle



- You calculate the current effects by comparing your DR to the Fix position

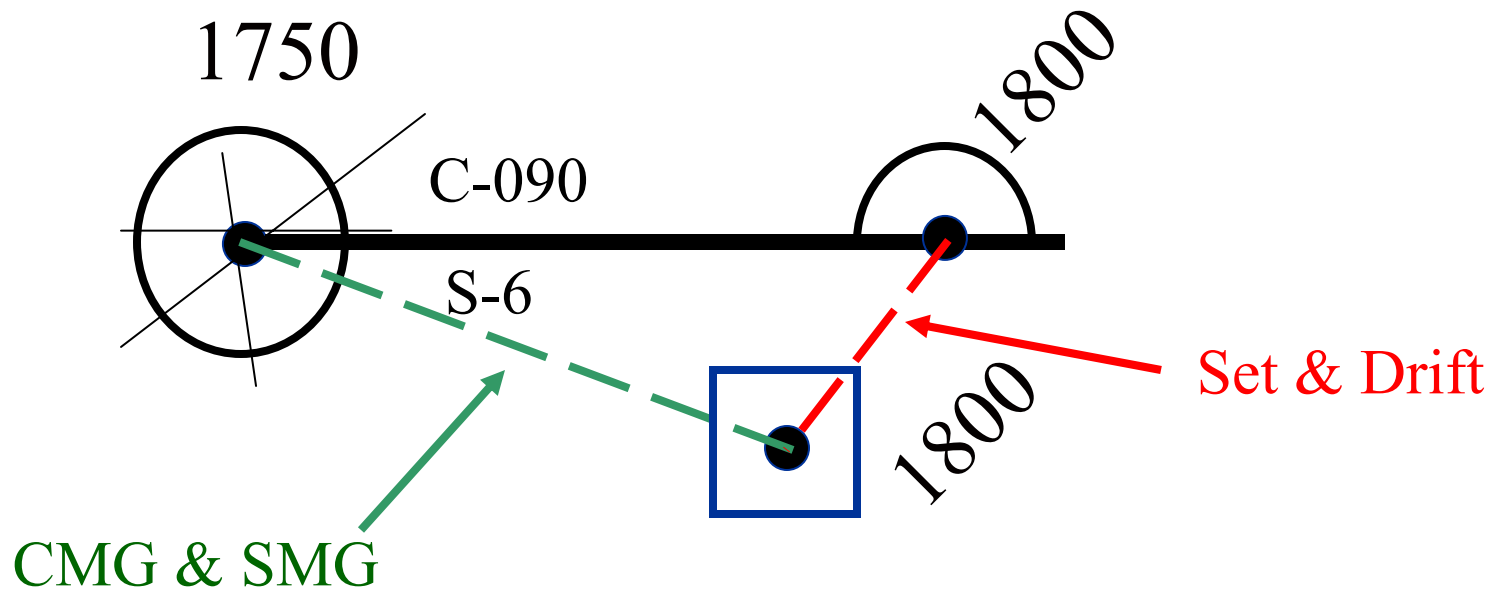




Estimated position



- You can thus estimate your next position by applying the set & drift to the next DR position

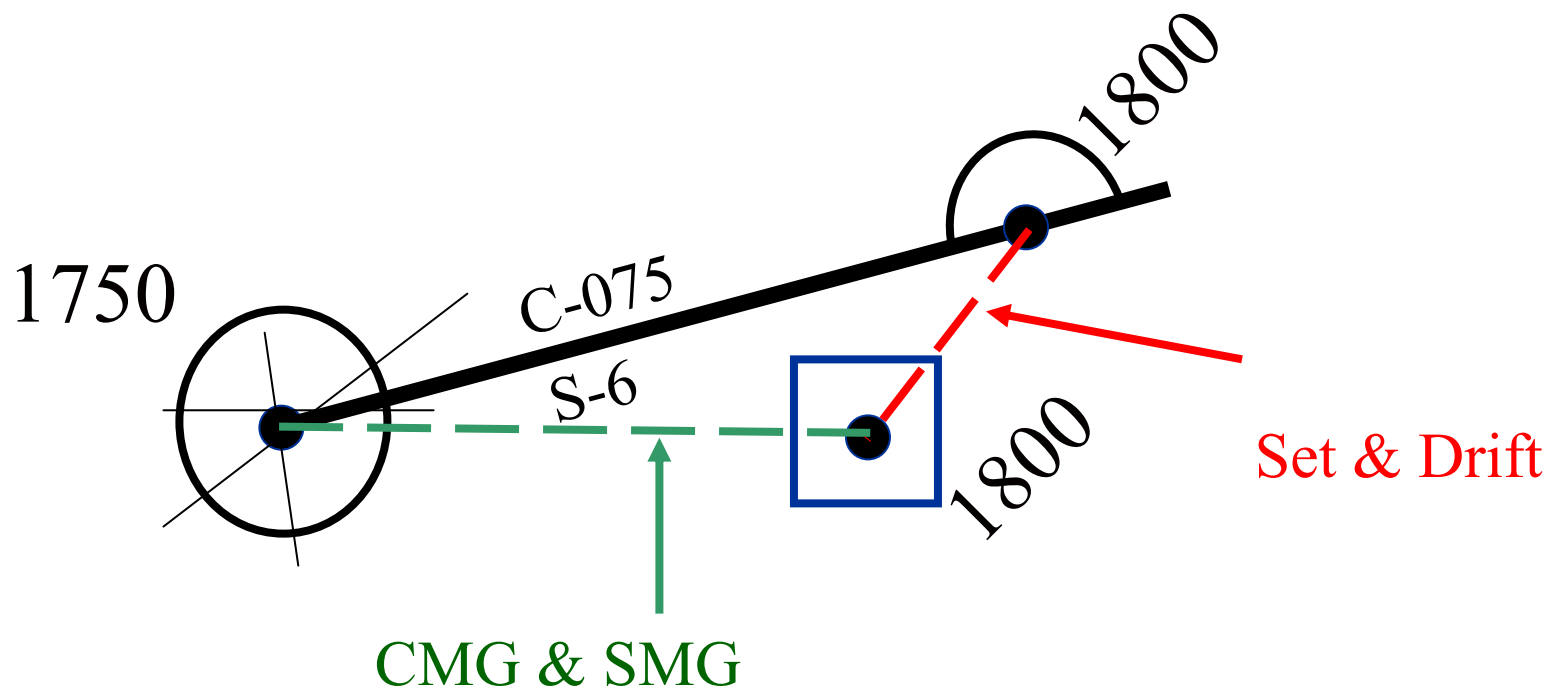




Correcting Course for current



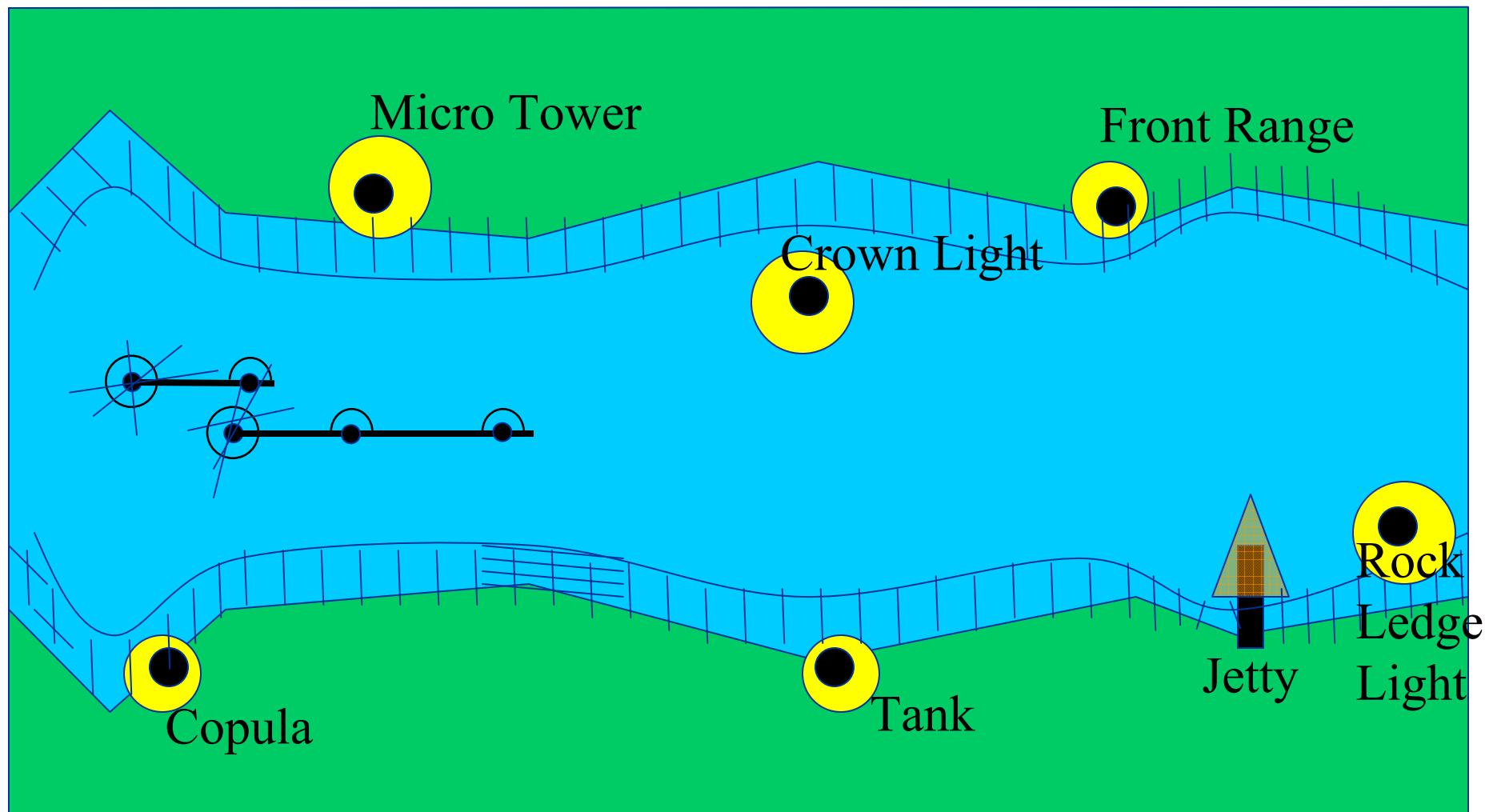
- You can also alter course to offset the set & drift so you can make the course over ground that you want (assuming the wind cooperates)





We Move...

Gaining and Dropping Nav Aids





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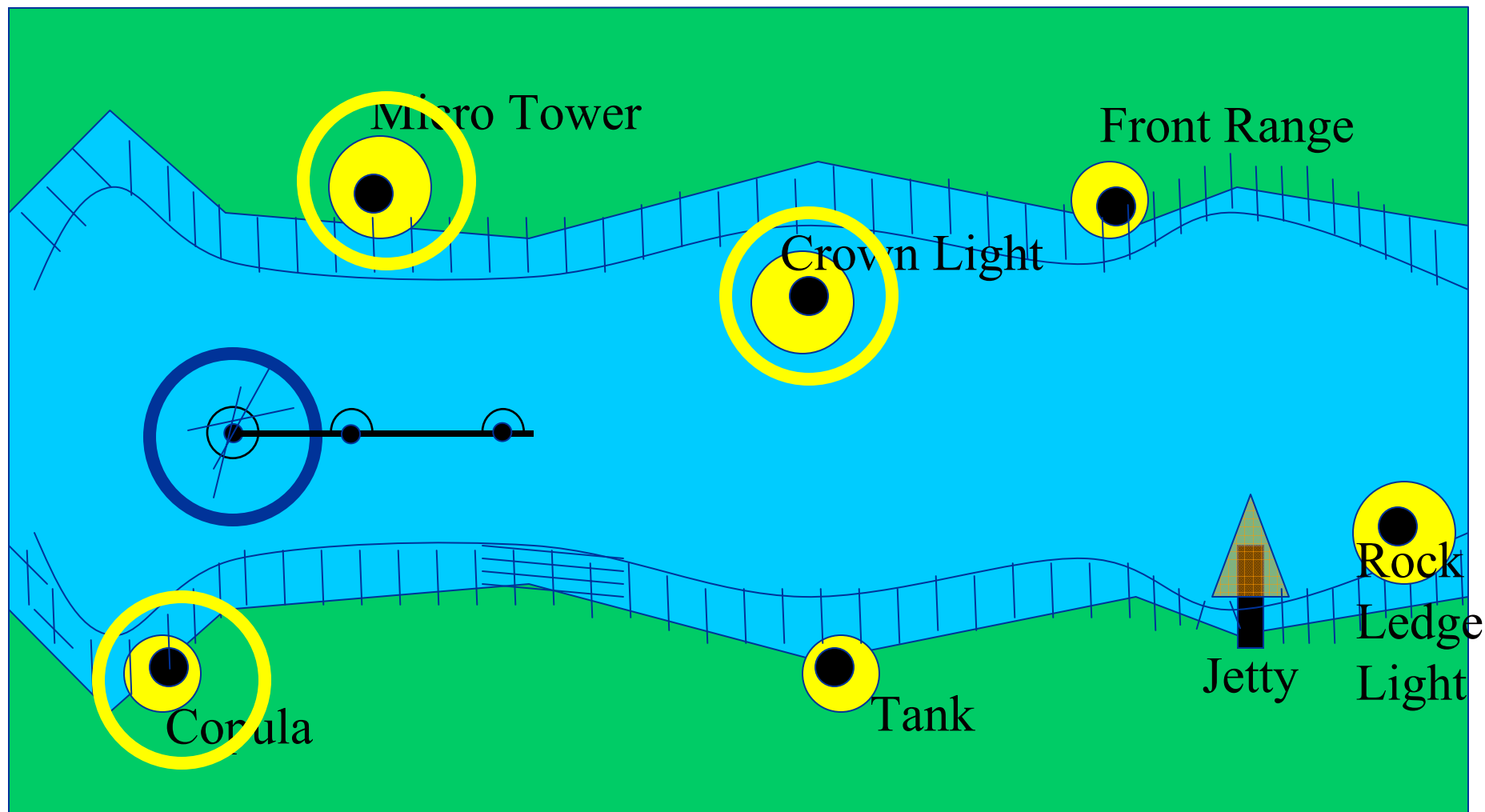
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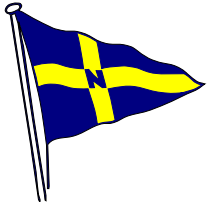
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We Move...

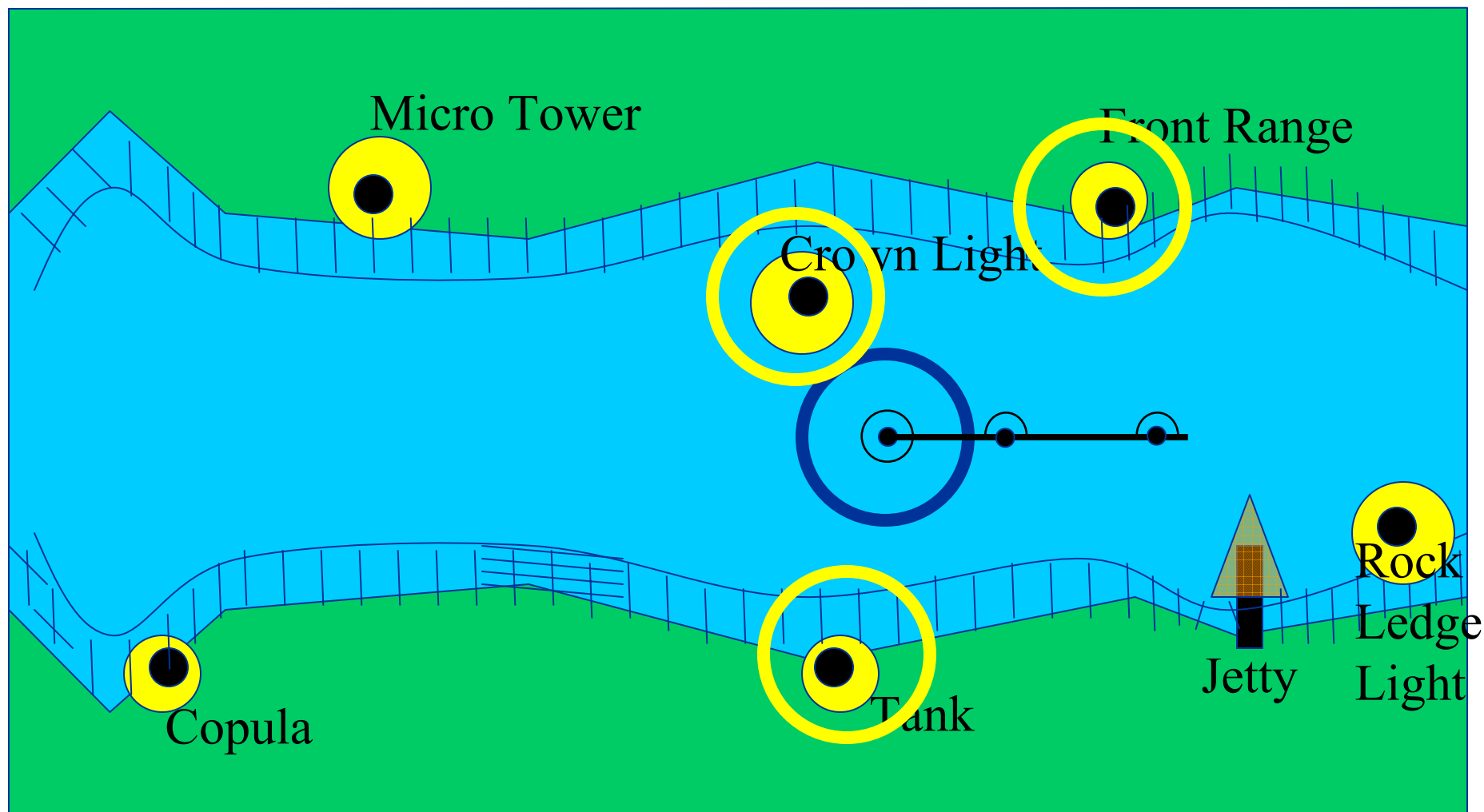
Gaining and Dropping Nav Aids





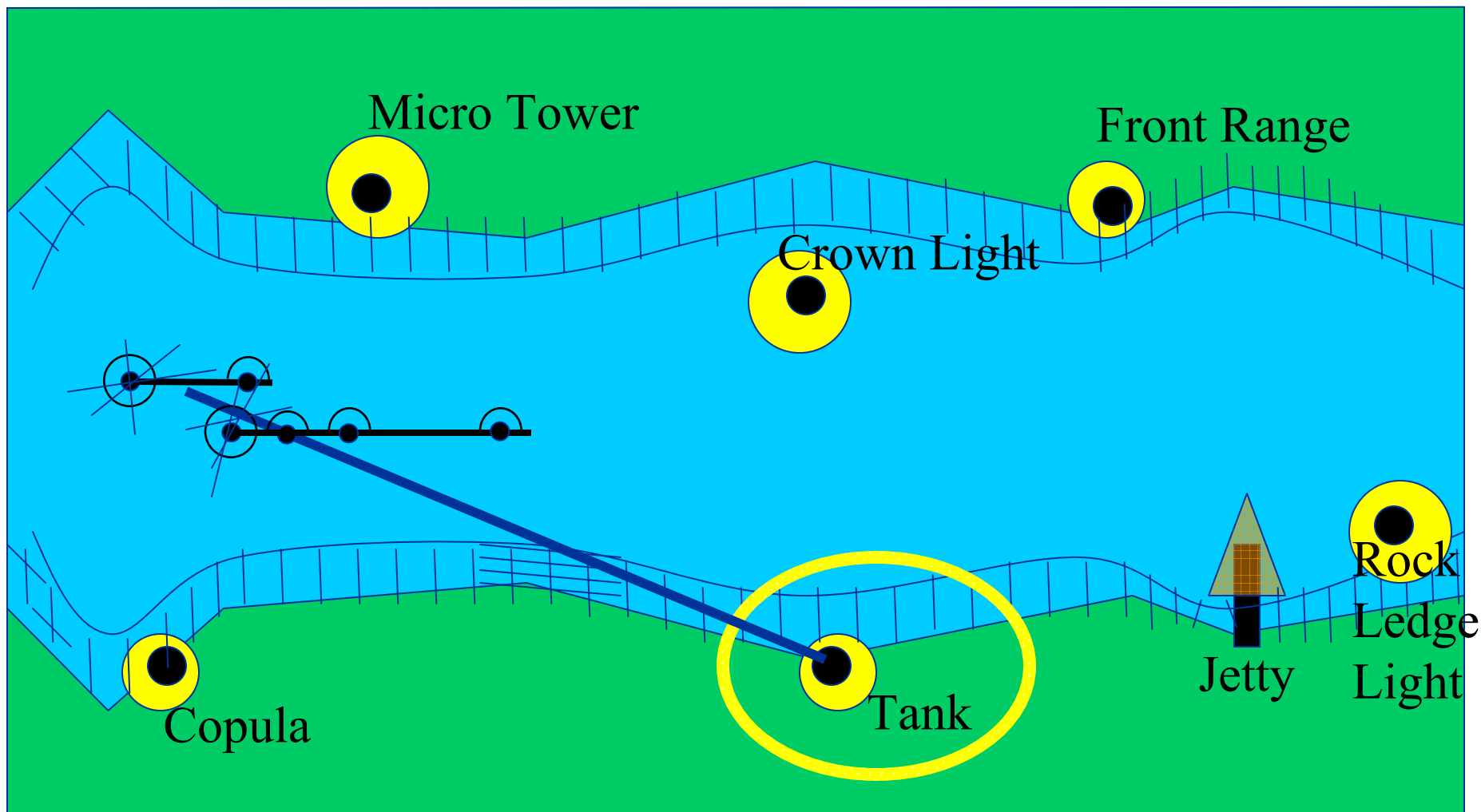
Skip Ahead...

Gaining and Dropping Nav Aids





Step 1: Sight & Identify





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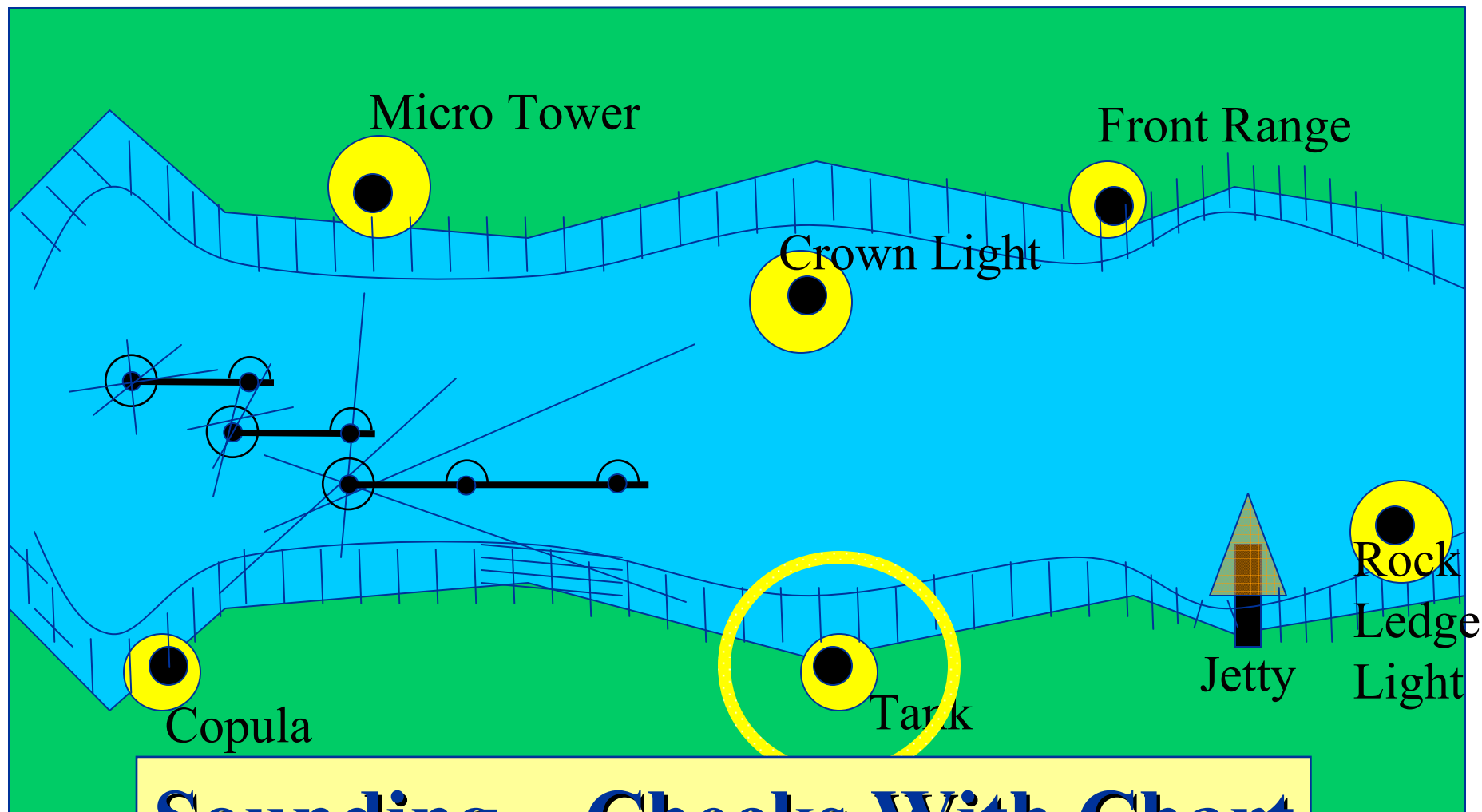


OPNAV FORM 3530/2 (Rev. 7-74)

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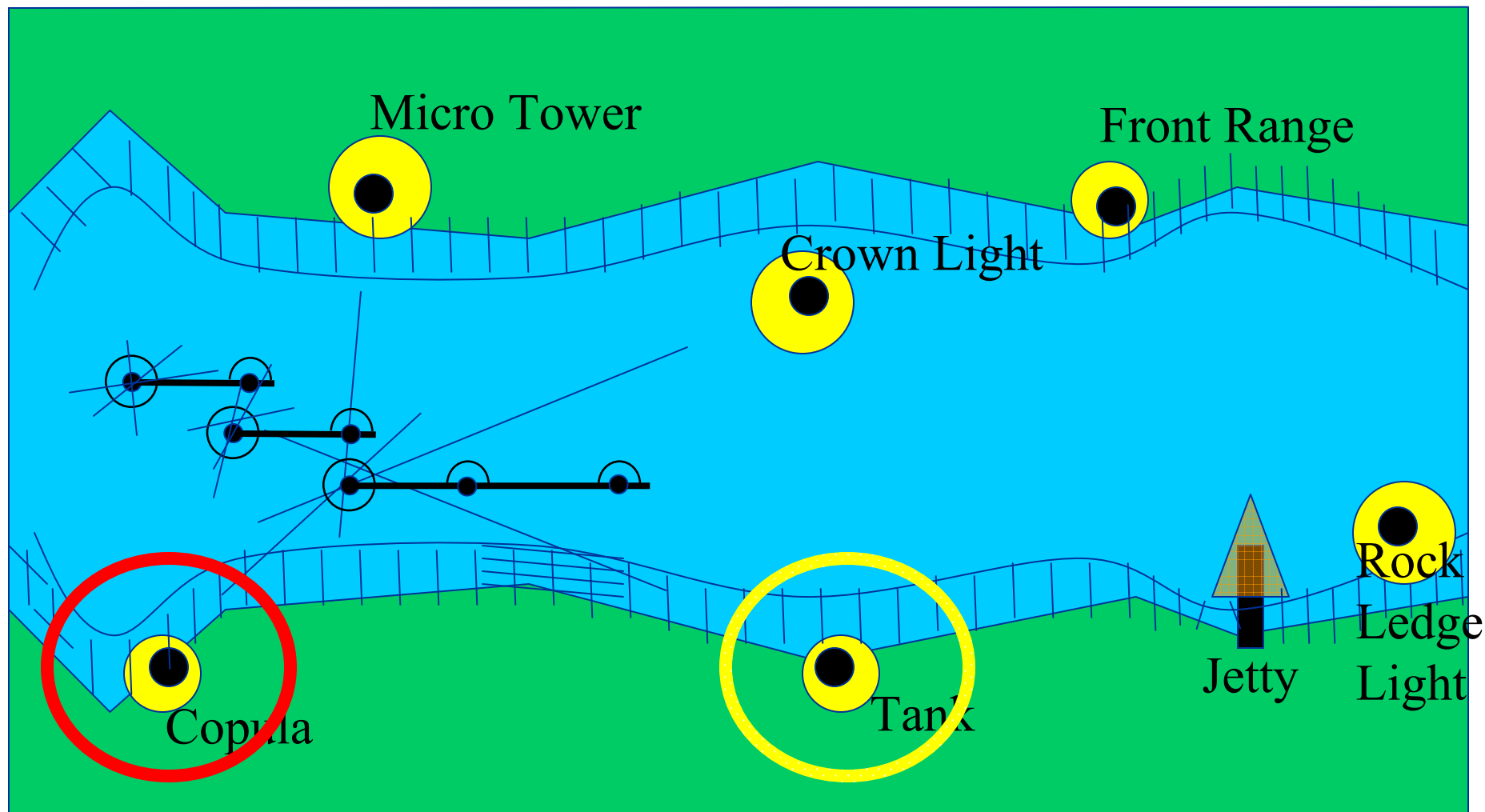
Step 2: Confirm With Fix



Sounding – Checks With Chart



Step 3: Gain & Drop





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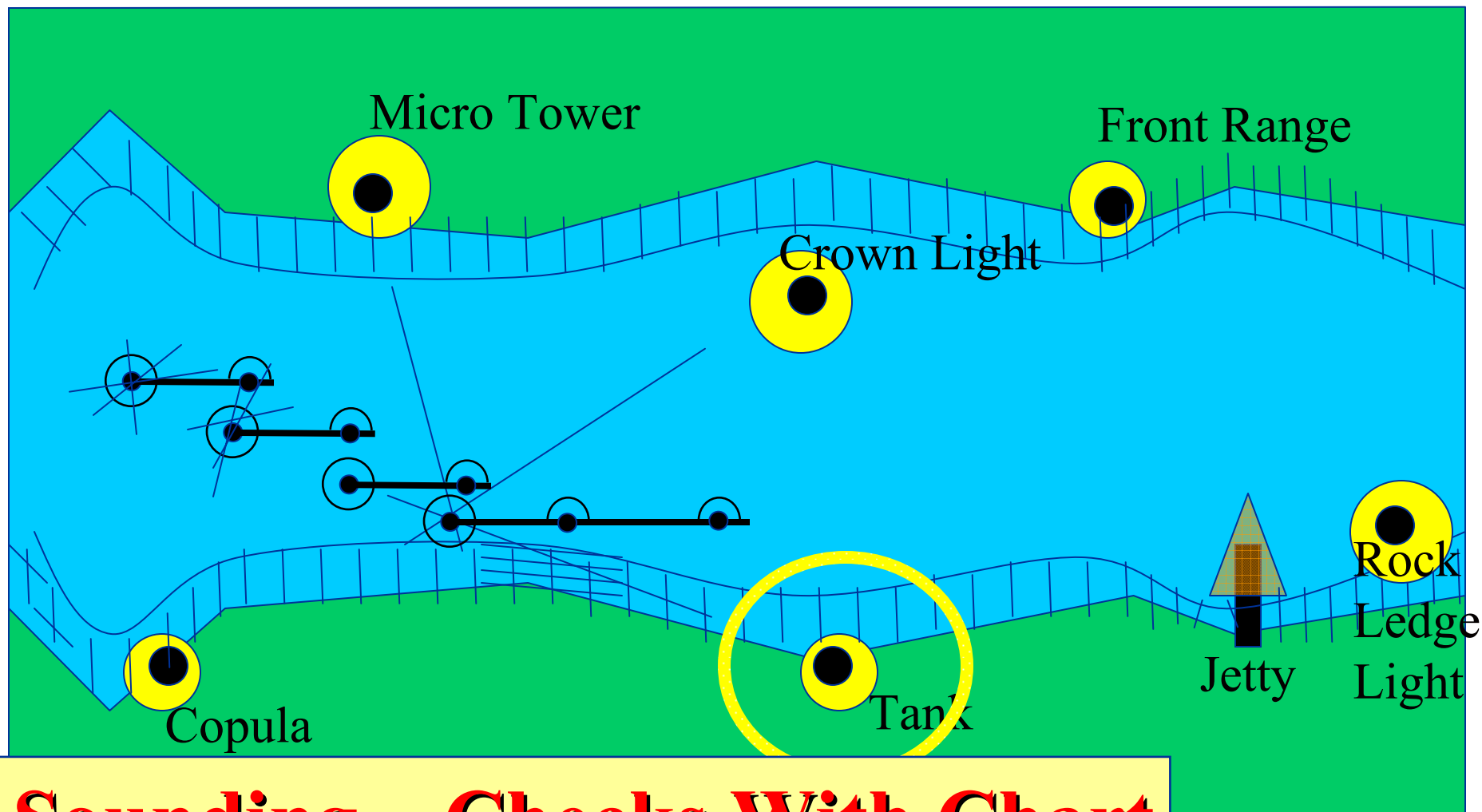
S/N: 0107-LF-724-5110

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Step 3: Gain & Drop



Sounding – Checks With Chart



The Bottom Line...



The DR is:

The Single Most Important Thing On the Chart



Homework



- Study 12222
- Practice Nav practical available on Blackboard if you want to practice. See LT De Azua for chart 12270.



Next Class...



The Chart

- Primary emphasis on chart preparation



The Fix

- Visual & Electronic
- Accuracy and errors



The DR

- The most important thing on the chart

• Making landfall

- The Navigation Brief

• Navigation Party

- Organization, procedures & philosophy

• Navigation Practical



Questions?



Questions?